

REMARKS

Claims 43-55 are pending. Claims 44-55 are amended. Support for the amendments to claims 44-55 can be found throughout the application as originally filed.

Claims 44-55 is amended to correct the dependency of each claim.

Claim 49 is amended to recite “[t]he antibacterial vascular prosthesis of claim 48 wherein substantially the entire surface of the porous basic structure is coated with silver.” Support for this amendment can be found throughout the specification and claims as originally filed.

The amendments are made solely for advancing prosecution. Applicants, by amending or cancelling any claims herein, make no admission as to the validity of any rejection and/or objections made by the Examiner. Applicants reserve the right to reassert the original scope of any claim in a continuing application.

No new matter is introduced to this application within the meaning of 35 USC §132.

In view of the following, further and favorable consideration is respectfully requested.

I. Claim Objections

The Examiner objected to claim 44-55 because the claims depend on cancelled claims.

Claims 44-55 are amended to correct the dependency of each claim. Accordingly, Applicants respectfully request the Examiner to reconsider and withdraw this objection.

II. Claim Rejection under 35 U.S.C. §112, Second Paragraph

In the Official Action, the Examiner rejected claim 49 for lacking antecedent basis for the phrase “the fibers”. Claim 49 is amended replace the phrase “the fibers” with the phrase “porous basic structure”. The phrase “porous basic structure” has basis in independent claim 43. Accordingly, Applicants respectfully request the Examiner to reconsider and withdraw this rejection.

III. Claim Rejections under 35 U.S.C. §103(a)

A. Trogolo et al. in view of Sioshansi et al.

In the Official Action, the Examiner rejected claims 43-46, 48-51 and 53-55 under 35 U.S.C. §103(a) as being unpatentable over Trogolo et al. (U.S. Patent No. 6,296,863) in view of Sioshansi et al. (U.S. Patent No. 5,474,797).

The Examiner asserts Trogolo et al. disclose an antibacterial vascular prosthesis comprising a porous textile material of non-absorbable or only slowly absorbable polymer material wherein the textile surface and pore surfaces are coated and sealed with an absorbable material, further comprising silver ions wherein the non-absorbable or only slowly absorbable polymer material further comprises silver atoms of the silver layer impressed into the surface. The Examiner acknowledges Trogolo et al. do not disclose depositing silver on the porous structure by means of an ion beam assisted deposition technique.

The Examiner further asserts Sioshansi et al. teach “a method of making an antibacterial prosthesis where silver is deposited by means of an ion beam assisted deposition technique for the purposes of enhancing the device’s infection-fighting ability and biocompatibility.”

The Examiner concludes it would have been obvious to one of ordinary skill in the art at the time the invention was made to use an ion beam assisted technique to apply the silver to the porous structure in order to enhance the device's infection-fighting ability and biocompatibility. The Examiner also concludes the layer thickness is a condition for which the optimum or workable ranges involve only routine skill in the art.

Applicants respectfully traverse this rejection.

To establish a *prima facie* case of obviousness, the PTO must satisfy three requirements. First, as the U.S. Supreme Court recently held in *KSR International Co. v. Teleflex Inc.*, 550 U.S. 398 (2007), "a court must ask whether the improvement is more than the predictable use of prior art elements according to their established functions. ... it can be important to identify a reason that would have prompted a person of ordinary skill in the relevant field to combine the elements in the way the claimed new invention does... because inventions in most, if not all, instances rely upon building blocks long since uncovered, and claimed discoveries almost of necessity will be combinations of what, in some sense, is already known." Second, the proposed modification of the prior art must have had a reasonable expectation of success, determined from the vantage point of the skilled artisan at the time the invention was made. *Amgen Inc. v. Chugai Pharm. Co.*, 18 USPQ 1016, 1023 (C.C.P.A. 1970). Lastly, the prior art references must teach or suggest all the limitations of the claims. *In re Wilson*, 165 USPQ 494, 496 (C.C.P.A. 1970).

In this respect, a proper case of *prima facie* obviousness has not been established in the present application, because Trogolo et al. and Sioshansi et al.,

whether taken alone or in combination, fail to teach or suggest all the elements/limitations of the present claims, as required by *In re Wilson*.

In the present application, independent claim 43 recites "An antibacterial vascular prosthesis prepared by a process comprising the steps of: (a) providing a porous basic structure; (b) depositing silver onto the surface of the porous basic structure by means of an ion beam assisted deposition technique; and (c) impregnating the silver coated porous basic structure with an absorbable material."

As such, Applicants submit the combination of Trogolo et al. and Sioshansi et al. fail to teach or suggest all the elements of the presently claimed antibacterial vascular prosthesis, and thereby fail to render the presently claimed antibacterial vascular prosthesis obvious. More specifically, the combination of Trogolo et al. and Sioshansi et al. fail to teach or suggest an antibacterial vascular prosthesis prepared by a process comprising the steps of: (a) providing a porous basic structure; (b) **depositing silver onto the surface of the porous basic structure** by means of an ion beam assisted deposition technique; and **then** (c) impregnating the silver coated porous basic structure with an absorbable material.

In other words, Trogolo et al. teach the silver powder is applied to the coating material and becomes **immersed into and bonds with the coating material**. Further, Trogolo et al. teach the antimicrobial agent is **on the surface** of the fabric bonded to the coating material and is available to provide antimicrobial action relative to fluids and body parts **that come into contact with it**. See col. 2, lines 1-4. Nowhere do Trogolo et al. teach the silver powder can be applied directly to the fabric and then coated with an absorbable material.

Sioshansi et al. is relied on to teach the silver powder of Trogolo et al. can be applied by way of an ion beam assisted deposition technique. The combination of references does not teach depositing silver directly onto the surface of the basic porous membrane by way of an ion beam assisted deposition technique and *then* impregnating the silver coated basic porous structure with an absorbable material, as is required by the presently pending claims.

Further, even if one of ordinary skill in the art were to read Sioshansi et al. as a modification of Trogolo et al. to deposit the silver ions directly on the surface of the porous basic membrane and then coating the membrane with an absorbable material, the modified device of Trogolo et al. would not provide for a prosthesis that has the antimicrobial agent is *on the surface* of the fabric bonded to the coating material and is available to provide antimicrobial action relative to fluids and body parts *that come into contact with it*, as required by Trogolo et al. The antimicrobial agent would be beneath the absorbable material coating and would not in contact with the fluids or body parts are taught by Trogolo et al.

Further, the data presented in the specification as originally filed and in the Declaration under 37 CFR §1.132 attached herewith, show the unexpectedly superior results of preparing the vascular prosthesis in the manner recited in the presently pending claims. More specifically, comparative tests set forth in the Comparison Test and Artificial Infection sections of the specification provide data to show the unexpected advantages of the present subject matter. The results of the comparative tests are set forth below and in the attached Declaration.

Comparative Test

Vascular prosthesis with and without the absorbable impregnation layer were tested. The silver content of the vascular prosthesis without the absorbable impregnation layer in the phosphate buffer was initially 35 microgram/l and then fell rapidly, and then after 50 days slowly (15 microgram/l), and after 365 days it was ca. 5 microgram/l.

With regard to the vascular prosthesis *with* the absorbable impregnation layer, although no silver was added to the gelatin, a high content of silver in the range of ca. 70 to 80 microgram/l was initially found in the phosphate buffer, and although it decreased slightly it remained high until the absorbable layer had largely broken up. It was not until after about 50 days that the silver content in the phosphate buffer had fallen to the level shown after 50 days by the vascular prosthesis not provided with the impregnation coating, after which time the release of the silver ions into the phosphate buffer was essentially the same as in the vascular prosthesis without impregnation coating.

This comparison shows the silver layer was attacked via the impregnation coating, and silver ions were released into the impregnation coating, and the silver ions then entered the phosphate buffer at an increased rate and in increased number. The vascular prosthesis prepared with the impregnation layer thereafter showed a comparable release of silver ions, which means the initial strong release of silver has no negative effect on the long-term action.

Artificial Infection

Further, the infection rates of implants prepared according to the present subject matter were compared to the infection rates of implants prepared by adding silver to the impregnation layer (similar to Trogolo et al.). It was found that, in the implants according to the presently claimed subject matter, only 22%, corresponding to 8 out of 36 implants, were colonized with a small number of microbes, whereas, in the implants with silver acetate in the absorbable coating, infection was found in 67%, corresponding to 23 out of 36 implants.

The above experimental data show the vascular prosthesis of the presently claimed subject matter provides silver ions being release at an increased rate and in increased number. Further, the results presented in the present specification and attached Declaration with respect to infection rates show the infection rate is much lower for the vascular prosthesis prepared by the process of the presently claimed subject matter when compared to vascular prosthesis prepared with silver incorporated in the absorbable coating.

Accordingly, Applicants submit a *prima facie* case of obviousness has not been established in the present application and any potential *prima facie* case of obviousness, if established, is rebutted by the unexpected result in the present application. Therefore, the combination of Trogolo et al. and Sioshansi et al. do not render the presently claimed subject matter obvious. Accordingly, Applicants respectfully request the Examiner to reconsider and withdraw this rejection.

B. Trogolo et al. in view of Sioshansi et al. in further view of Ragheb et al.

In the Official Action, the Examiner rejected claim 47 under 35 U.S.C. 103(a) as being unpatentable over Trogolo et al. (above) in view of Sioshansi et al. (above) in further view of Ragheb et al. (U.S. Patent No. 5,873,904).

Applicants respectfully traverse this rejection. The instant subject matter, as well as Trogolo et al. and Sioshansi et al., are discussed above in Section III. A. and are incorporated herein by reference in their entirety. A discussion of Ragheb et al. was presented in the previous response filed March 26, 2010 and is incorporated herein by reference in its entirety. The Examiner acknowledges neither Trogolo et al. nor Sioshansi et al. teach the porous basic structure to be made of polytetrafluoroethylene.

Ragheb et al. does not cure the deficiencies of Trogolo et al. and Sioshansi et al., as outlined above in Section III. A. The Examiner relies on Ragheb et al. to teach the base material of a silver-coated medical device is polytetrafluoroethylene. Further, the Examiner notes polytetrafluoroethylene is used for its biocompatibility. The Examiner concludes it would have been obvious to one of ordinary skill in the art to construct the device of Trogolo et al. as modified by Sioshansi et al. with a polytetrafluoroethylene base material in order to utilize the material's biocompatibility. Ragheb et al. do not teach or suggest modifying Trogolo et al. to lead one of ordinary skill in the art to arrive at the presently claimed subject matter.

Applicants submit the combination of Trogolo et al., Sioshansi et al. and Ragheb et al. fail to teach or suggest all the elements of the presently claimed antibacterial vascular prosthesis, and thereby fail to render the presently claimed antibacterial vascular prosthesis obvious.

More specifically, the combination of Trogolo et al., Sioshansi et al., and Ragheb et al. fail to teach or suggest an antibacterial vascular prosthesis prepared by a process comprising the steps of: (a) providing a porous basic structure; (b) **depositing silver onto the surface of the porous basic structure** by means of an ion beam assisted deposition technique; and **then** (c) impregnating the silver coated porous basic structure with an absorbable material.

Further, as discussed above, the data presented in the specification as originally filed and in the Declaration under 37 CFR §1.132 attached herewith, show the advantages of preparing the vascular prosthesis in the manner recited in the presently claimed subject matter.

The experimental data discussed above show the vascular prosthesis of the presently claimed subject matter provides silver ions being release at an increased rate and in increased numbers. Further, the results presented in the present specification and attached Declaration with respect to infection rates show the infection rate is much lower for the vascular prosthesis prepared by the process of the presently claimed subject matter when compared to vascular prosthesis prepared with silver incorporated in the absorbable coating.

Accordingly, Applicants submit a *prima facie* case of obviousness has not been established in the present application and any potential *prima facie* case of obviousness, if established, is rebutted by the unexpected result in the present application. Therefore, the combination of Trogolo et al., Sioshansi et al., and Ragheb et al., do not render the instantly claimed subject matter obvious. Accordingly, Applicants respectfully request the Examiner to reconsider and withdraw this rejection.

C. Trogolo et al. in view of Sioshansi et al. in further view of Shikani et al.

In the Official Action, the Examiner rejected claim 52 under 35 U.S.C. 103(a) as being unpatentable over Trogolo et al. (above) in view of Sioshansi et al. (above) in further view of Shikani et al. (U.S. Patent No. 5,762,638).

Applicants respectfully traverse this rejection. The instant subject matter, as well as Trogolo et al. and Sioshansi et al., are discussed above in Section III. A. and incorporated herein by reference in their entirety. A discussion of Shikani et al. was presented in the previous response filed March 26, 2010 and is incorporated herein by reference in its entirety. The Examiner acknowledges Trogolo et al. and Sioshansi et al. do not teach using active substances in the absorbable coating.

Shikani et al. does not cure the deficiencies of Trogolo et al. and Sioshansi et al. as outlined above in Section III. A. The Examiner relies on Shikani et al. to teach that it is known in the art to place drugs in the outer coating of a device such that it can be programmed to be released after a certain period of time based on the choice of the outer coating. The Examiner concludes it would have been obvious to one of ordinary skill in the art to use such an outer coating on Trogolo et al.'s prosthesis to prevent inflammation and granulation tissue at the site if implantation.

As such, Applicants submit the combination of Trogolo et al., Sioshansi et al. and Shikani et al. fail to teach or suggest all the elements of the presently claimed antibacterial vascular prosthesis, and thereby fail to render the presently claimed antibacterial vascular prosthesis obvious.

More specifically, the combination of Trogolo et al., Sioshansi et al., and Shikani et al. fail to teach or suggest an antibacterial vascular prosthesis prepared by a process

comprising the steps of: (a) providing a porous basic structure; (b) **depositing silver onto the surface of the porous basic structure** by means of an ion beam assisted deposition technique; and **then** (c) impregnating the silver coated porous basic structure with an absorbable material.

Further, as discussed above, the data presented in the specification as originally filed and in the Declaration under 37 CFR §1.132 attached herewith, show the advantages of preparing the vascular prosthesis in the manner recited in the presently pending claims.

The above experimental data show the vascular prosthesis of the presently claimed subject matter provides silver ions being release at an increased rate and in increased number. Further, the results presented in the present specification with respect to infection rates show the infection rate is much lower for the vascular prosthesis prepared by the process of the presently claimed subject matter when compared to vascular prosthesis prepared with silver incorporated in the absorbable coating.

Accordingly, Applicants submit a *prima facie* case of obviousness has not been established in the present application and any potential *prima facie* case of obviousness, if established, is rebutted by the unexpected result in the present application. Therefore, the combination of Trogolo et al., Sioshansi et al., and Shikani et al., do not render the instantly claimed subject matter obvious. Accordingly, Applicants respectfully request the Examiner to reconsider and withdraw this rejection.

CONCLUSION

In view of the foregoing, Applicants submit that the application is in condition for immediate allowance. Early notice to that effect is earnestly solicited. The Examiner is invited to contact the undersigned attorney if it is believed that such contact will expedite the prosecution of the application.

In the event this paper is not timely filed, Applicants petition for an appropriate extension of time. Please charge any fee deficiency or credit any overpayment to Deposit Account No. 14-0112.

Respectfully submitted,

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